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ABSTRACT

What advanced 4- and 5-year-old children know about night and day in relationship to the earth and sun was studied to test the hypothesis that two teaching activities would help children to understand the cause of the phenomenon. Participants were 21 middle to upper class boys and girls enrolled in a part-time early childhood enrichment program offered at a university. Most subjects were gifted. Two groups were formed of students enrolling in the program at different times; one student was enrolled in both groups. Group A was taught earth and sun concepts through the use of a role-playing activity. Group B was taught through the use of a globe and flashlight. Students were interviewed before and after instruction to ascertain their understanding of the earth and sun as well as to determine the effect the activities had upon their learning. Over half of the subjects made gains in understanding the concepts. Results from both groups were similar, with slightly more positive gains being achieved by Group A students. The students in both groups revealed increased understanding in the interviews following both types of instruction. It was concluded that these results dispute past studies claiming that earth and sun concepts are too abstract for young children to understand. Most students learned the concepts. However, it appeared that the relationship between the concepts is very difficult for young students to understand. (RH)

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Children's Understanding of Night and Day: A Research Report Presented at NCSS, 1984

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Introduction

What do children know about earth and sun concepts? This study represents an attempt to discover what advanced four and five-year-olds know about night and day in relationship to the earth and sun. In addition, two teaching activities were used in an attempt to teach children about the relationship between the earth and sun. It was hypothesized that these activities would help children to understand the cause of night and day.

Review of Research

Research supports the premise that very young children know little about the reasons for night and day. Several researchers (Nussbaum, 1979; Mali and Howe, 1979; Klein, 1982) have concluded that children have many different and inaccurate ideas about earth and sun concepts. Seefeldt (1980) believes that children can observe the results of earth's movement and can relate them to their lives but are not developmentally ready for an explanation of how the earth revolves about the sun. Researchers to date believe that earth and sun relationships are too abstract for young children to learn. Perhaps this is because young children are in the preoperational period of development.

Ambron (1981) states that when children are in the preoperational period they have four limitations. One of these is labeled centration. Centration causes young children to focus attention on only one aspect of a situation. Therefore, relationships between several aspects cannot be understood. One other limitation

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that relates to this study is that children cannot understand how something changes, then returns to its original condition. Tagatz (1976) and Morrison (1980) further state that children in the preoperational period are egocentric and bound by their own thoughts. Therefore, concepts about the earth and sun must relate to the child's experience and environment. Children will only perceive concepts about the earth and sun in terms of how it relates to them. Keeping the research literature in mind, the researcher used two age-appropriate activities to assess any change that might occur in the child's understanding about night and day.

Sample

The sample used for this study consisted of twenty-one (21) children ranging in age from three and one-half (3½) years old to five and one-half years old (5½). The population of children were enrolled in a part-time early childhood enrichment program at Trinity University. Group A consisted of fourteen (14) students enrolled in May, 1984. Group B consisted of seven (7) students enrolled in September, 1984. One student in the population was enrolled in both groups. Both groups contained a balanced proportion of boys and girls from middle to upper socio-economic classes. The majority of students are considered gifted for their age level.

Activities

Group A was taught earth and sun concepts through the use of a role playing activity. The activity consisted of students (14) forming a face-outward circle and rotating counter clockwise in order to represent the earth and its movement. The researcher represented the sun by standing still while holding a flashlight. As the students (earth) rotated, they could see light (day) and darkness (night) as they moved. A research assistant verbally reinforced night and day positions as the students rotated around the light of the sun.

Group B was taught earth and sun concepts through the use of a globe and flashlight. The flashlight represented the sun. The globe represented the earth. The flashlight was positioned on the earth and remained stationary while the researcher rotated the globe (earth). At the same time, verbal reinforcement was used to stress the concepts of night and day.

Data Collection

The interview technique was used to reveal the children's understanding of earth and sun concepts. Students were pre and post interviewed to ascertain their understanding of the earth and sun as well as the effect the activities had upon their learning. The same questions were asked in both the pre and post interviews. The eleven concepts for which understanding was assessed follow:

(1) What is the sun?
(2) Where is the sun?
(3) What does the sun do?
(4) Does the sun move?
(5) What is the earth?
(6) Where is the earth?
(7) What does the earth do?
(8) Does the earth move?
(9) What is night?
(10) What is day?
(11) What makes night and day?

Students were pre-interviewed several days before the activities were taught. Immediately following the lesson the students were post-interviewed. Notes from the pre-interview were compared to the post-interview for each student. The scoring of the interviews involved checking individual pre-interview responses to the post-

interview responses for each question. The comparison of the responses determined whether or not any understanding of the earth and sun concepts occurred.

Results

The interviewing data was compiled into three categories. The categories were as follows:

I. High. Students who did well on the pre-interview and positively increased their understanding on the post interview.

II. Medium. Students who did poorly on the pre-interview but positively increased their understanding in four or more questions.

III. Low. Students who did poorly on the pre-interview and had less than two positive increases in the post-interview.

Table I shows the number of students in each Category by Activity

Table I

		CATEGORY			
		I	II	III	
ACTIVITY	A	3	5	6	N = 14
	B	1*	2	4	N = 7

*Student was also in Activity A. TOTAL N = 21

Over half of the total students made positive gains in understanding earth and sun concepts. The results from both activities groups are similar. However, there were slightly more positive gains for those students taught with Activity A. It should be noted here that the student in both activities increased his understanding in each post-interview. He scored Category I for Activity A and Activity B. He was the only student in 21 to have a perfect post-interview score. He also possessed the most pre-interview knowledge of the earth and sun concepts than any of

the other students in the sample.

Overall, the most positive gains in the post-interview responses occurred in the concept of earth movement. Eleven students in Activity A learned that the sun does not move but the earth does. Two students, however, showed no gain in this concept. Five students in Activity B learned that the sun does not move but the earth does. Two students in this group as well showed no gain in this concept. Only two students in Activity A and two students in Activity B were able to state that night and day is caused by the rotating (spinning) of the earth.

The results of this study dispute past research studies that claim that earth and sun concepts are too abstract for young children to understand. Most students learned the concepts. However, it appears that the relationship between the earth and sun is very difficult for young students to understand. This particular finding agrees with the cognitive theory of the preoperational child. Students at this level have a difficult time understanding the relationship of the sun to earth, especially the effect of the relationship.

Conclusions and Recommendations

1. Basic earth and sun concepts can be understood by children if presented with activities or models. Age-appropriate activities are needed if young children are to learn "abstract" concepts.

2. The relationship between earth and sun, especially cause and effect, is difficult for many children to understand. More than one lesson is needed to teach this understanding. A unit of study containing many experience lessons needs to be taught and researched. A unit is needed in order to find out if deliberate long-term teaching will lead to children's understanding of the relationship between earth and sun and night and day.

3. There is a need for more research in the area of "abstract" concepts. Studies which have tighter statistical designs and controlled variables are needed to discover just what concepts students can and cannot learn.

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